What is claimed is:

1. An antenna structure comprising:

(a) a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the conductive plane having an opening therein; and

(b) an antenna driving element disposed adjacent the opening in the conductive plane, which driving element, in operation, excites the antenna structure by pumping RF energy through the opening in the conductive plane.

2. The antenna structure of claim 1 wherein the conductive plane and the array of conductive elements are disposed on opposite side of a insulating substrate.

3. The antenna structure of claim 2 wherein each of the elements in the array is coupled to the conductive plane by a conductive via arranged through the insulating substrate.

4. The antenna structure of claim 3 wherein each conductive element in the array of conductive elements is of a polygonal configuration and wherein the conductive elements in the array are arranged in a regular repeating pattern of polygonal configurations.

5. The antenna structure of claim 4 wherein the polygonal configuration of each conductive element is a rectangle.

6. The antenna structure of claim 5 wherein the polygonal configuration of each conductive element is a square and wherein the square conductive elements are arranged with a common pitch in said array.

7. The antenna structure of claim 6 wherein the opening in the conductive plane is rectangular, having a breadth which is about 0.5 of a wavelength to one wavelength of the operating frequency of the antenna structure and a width which is no greater than the common pitch of the conductive elements in the array.

8. The antenna structure of claim 7 wherein the width of the opening in the conductive plane is approximately equal to a spacing between adjacent ones of the conductive elements in said array.

9. The antenna structure of claim 7 wherein the antenna driving element is a waveguide.

10. The antenna structure of claim 9 wherein the waveguide has walls adjacent its aperture, which walls have a rectangular configuration adapted to mate with the opening in the conductive plane.

11. The antenna structure of claim 7 wherein the antenna driving element is a microstrip radiator disposed opposite the opening in the conductive plane, spaced from the opening in the conductive plane by a distance which is less than 10% of a wavelength of the operating frequency of the antenna structure.

12. The antenna structure of claim 1 wherein the array of conductive elements is spaced from the conductive plane by a distance which is no greater than 10% of a wavelength of an operating frequency of the antenna structure

13. A method of making a low profile, wide band gap antenna comprising:

(a) providing a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the

conductive plane having an opening therein; and

(b) disposing an antenna driving element adjacent the opening in the conductive plane.

14. The method of claim 13 wherein the conductive plane and the array of conductive elements are disposed on opposite sides of an insulating substrate.

15. The method of claim 14 wherein the insulating substrate is of a type compatible with printed circuit manufacturing technology and wherein the array of conductive elements are formed thereon using printed circuit board manufacturing technology.

16. The method of claim 14 further including coupling each of the elements in the array to the conductive plane by a conductive via arranged through the insulating substrate.

17. The method of claim 16 wherein each conductive element in the array of conductive elements has a polygonal configuration and further including the step of arranging the conductive elements in the array are arranged in a regular repeating pattern of polygonal configurations.

18. The method of claim 17 wherein the polygonal configuration of each conductive element is a rectangle.

19. The method of claim 18 wherein the polygonal configuration of each conductive element is a square and wherein the square conductive elements are arranged with a common pitch in said array.

20. The method of claim 19 wherein the opening formed in the conductive plane is rectangular, having a breadth which is about 0.5 of a wavelength of the operating frequency of the antenna structure and a width which is no greater than the common pitch of the conductive elements in the array.

21. The method of claim 20 wherein the width of the opening in the conductive plane is approximately equal to a spacing between adjacent ones of the conductive elements in said array.

22. The method of claim 20 wherein the antenna driving element is a waveguide.

23. The method of claim 22 wherein the waveguide has walls adjacent its aperture, which walls have a rectangular configuration adapted to mate with the opening in the conductive plane.

24. The method of claim 20 wherein the antenna driving element is a microstrip radiator disposed opposite and spaced from the opening in the conductive plane by a distance which is less than 10% of a wavelength of the operating frequency of the antenna structure.

25. The method of claim 13 wherein the array of conductive elements is spaced from the conductive plane by a distance which is no greater than 10% of a wavelength of an operating frequency of the antenna structure.